INSTALLATION TESTING OF U.A.X.s No.13 AND No.13X

(Formerly Specification TE 2735)

GENERAL

1. Scope of Instruction. The tests detailed in this instruction should be made after the completion of the cabling of the units (see G 3530) and no departure from these instructions should be made without the authority of the Eng. Dept. (E). Immediately a fault is encountered, it should be cleared by the testing officer, and any mechanical re-adjustments should be made in accordance with the relative maintenance-adjustment instructions.

2. Testing Apparatus Required. The tests should be conducted by two testing officers and the following apparatus will be required:-

Buzzer and dry cells
Ohmmeter (250-V.)
2 Telephones No.121F
3 Resistors, Coil, No.12 - 1200 ohms
1 Detector No.4
6 Plugs No.222
6 Clips, Test, No.23A, 23B and 23C
1 Tester AT 4569 } For relay-current tests
1 Tester AT 4557 }
1 Oscillator No.8A } For transmission tests
1 Tester TL 1635 }
1 Dialling Unit AT 3716 }
1 Telephone No.80, with Plug 611, } In advance of maintenance requirement
1 Tester AT 4239 }

3. Straps should be provided on selector and junction relay-set U-points, vertical-marking banks, allotter- and miscellaneous connexion-strips, and test-set terminals, in accordance with the notes on the relative diagrams.

CONTINUITY TESTS

4. General. Continuity tests should be made before any jumpers are connected and the battery main fuse should be removed. The point-to-point testing should be done by buzzing methods. Access should be obtained via the selector wipers, where convenient, and the wipers should be stepped manually over the bank contacts.

5. *Tests to be applied to particular installations.* Installations cabled in accordance with G 3530 (Cabling Scheme No.2) should be tested in accordance with tests 1 to 24 and 30 to 37 in Table 1. Installations cabled in accordance with G 3530 (Cabling Scheme No.1) should be tested in accordance with tests 1 to 15, 25 to 29 and 30 to 37 in Table 1.

Table 1 follows

TABLE 1

Test	Circuit	Prove Continuity				Remarks
		From		To		
		Unit	Access Point	Unit	Access Point	
1	-ve, +ve and P1	C	M.D.F. Line side of arrestors	A1	F/S Mult.	Last bank
2	-ve, +ve, P1 and P2	A1	F/S. Mult. Last bank	A2	F/S. Mult.	" "
3	Repeat tests 1 and 2 for units A3 and A4, if fitted					
4	-ve, +ve, M and P1	C	I.D.F. Local side L/F. levels	A1	L/F. Mult. Level 1	" "
5	P2	C	" "	A1	L/F. Mult. Level 2	" "
6	-ve, +ve	C	" "	A1	L/F. Mult. Levels 3-8	" " Operate K relay of each circuit
7	P	C	" "	A1	LTJ Levels 3-8	
8	Repeat tests 4 to 7 for units A2, A3 and A4, if fitted					
9	HA and HB	C	I.D.F. Mult. side (RM - tags)	A1	L/F. Vertical-marking bank Levels 1 & 2	On all L/F.s
10	YA and YB	C	I.D.F. Mult. side STR tags	A1	YA & YB resistors	Group-start equipment
11	T, TA, TB, ST, -ve, +ve	C	I.D.F. Mult. side	A1	Control-set U-points 30, 5, 7, 29, 22, 24	Control-set removed
12	Repeat tests 9 to 11 for units A2, A3 and A4, if fitted					
13	-ve, +ve, P, M	C	I.D.F. Local side G/S. Mult.	A1	G/S. Mult. Levels 4-8	Last bank
14	-ve, +ve, P, M	C	" "	A1	G/S. Mult. Level 9-0	" " SHELF E
15	-ve, +ve, P, M	C	" "	A1	G/S. Mult. Level 9-0	Last bank SHELF F
16	Repeat tests 13 to 15 for units A2, A3 and A4, if fitted					
17	-ve, +ve, P, M	A1	G/S. Mult. Level 2. Outlets 1-5	A1	F/S. U-points 1, 2, 9, 7	Remove F/S. from shelves and insulate U9 & U11
18	-ve, +ve, P, M	A1	G/S. Mult. Level 2. Outlets 6-10	A2	" " "	
19	Repeat tests 17 and 18 from unit A1 for level 3 to F/S. U-points in A3 and A4, if fitted					
20	-ve, +ve, P, M	A1	G/S. Mult. Levels 2 and 3 (1st bank)	A2	G/S. Mult. Levels 2 & 3	Last bank
21	Overflow M-wire	A1	G/S. Mult. 11th step. Levels 2-0 (1st bank)	A2	G/S. Mult. 11th step. Levels 2-0	" "
22	Repeat tests 20 and 21 for A2-A3 and A3-A4, if fitted					
23	Common services cabling, tones, alarms etc.	C	Miscellaneous tag block	A1	Miscellaneous tag block	
24	Repeat test 23 for A2, A3, A4, if fitted					
25	-ve, +ve, P, M	C	I.D.F. Local side. G/S. Mult. Levels 2 & 3	A1	G/S. Mult. Levels 2 & 3	" "
26	Overflow M-wire	C	I.D.F. Local side	A1	G/S. Mult. Levels 2-0	" "

TABLE 1 *(Contd.)*

Test	Circuit	Prove Continuity				Remarks
		From		To		
		Unit	Access Point	Unit	Access Point	
27	Repeat tests 25 to 26 from C unit to A2, A3 and A4, if fitted					
28	-ve, +ve, P, M	C	I.D.F. Mult. side I/C. F/S.	A1	F/S. U-points 1, 2, 9, 7	Remove F/S. from shelves and insulate U9-U11
29	Repeat test 28 for A2, A3 and A4, if fitted					
30	+ve, -ve, P1, P2, M (I/C. junctions)	C	I.D.F. Mult. side junctions to L/F. Levels	B	Junction R/S. tags	Refer to ATW diagram of R/S. under test
31	+ve, -ve, P, M, M9 (O/G. junctions)	C	I.D.F. Mult. side junctions from G/S. levels	B	" "	" "
32	+ve, -ve, P, (B/W. junctions)	C	I.D.F. Mult. side junctions via incoming junctions	B	" "	" "
33	+ve, -ve, P, (junction hunters)	C	I.D.F. Mult. side junction-hunter bank	B	Junction-hunter wipers	Step over each contact, in turn
34	-ve, +ve, P (junctions to line), via I.D.F.	C	I.D.F. Local side junctions R/S. to junctions, via M.D.F.	B	Junction R/S. tags	Refer to ATW diagram of R/S. under test
35	ST. -ve, +ve, TA, TB, T, STR, RM (junction start-control)	C	I.D.F. Local side junctions R/S. to L/F.-control R/S.	B	" "	Control-set No.1 and Control set No.2 "
36	Common services cabling of tones alarms, pulses etc.	C	Miscellaneous tag block	B	Miscellaneous tag block	
37	Repeat tests 30 to 36 for each B unit, in turn, where the relevant tests apply					

INSULATION TESTS

6. General. Insulation tests should be made before any jumpers are connected. Battery and earth should be connected to the units, and the press-button in the C-unit should be temporarily short-circuited. Any alarm faults should be cleared immediately.

7. *The insulation resistance of the equipment* should be not less than 10 megohms, except in the case of Test 3 for which it should be not less than 1 megohm.

8. *Insulation tests* should be made in accordance with Table 2.

TABLE 2

Test	Circuit	Access Point	Ohmmeter Connexions		Method
			L	E	
1	Final selector multiple	Final-selector wipers	-ve and P wipers	+ve wiper and earth	Step selrs. manually over each contact, in turn; omit line 99
			+ve and P	-ve and earth	
2	Linefinder multiple	Linefinder wipers	-ve	+ve, P and earth	Earth LTJ to operate K relay on each circuit, in turn
			+ve	P and earth	ditto
			P	M and earth	

TABLE 2 *(Contd.)*

Test	Circuit	Access Point	Ohmmeter Connexions		Method
			L	E	
3	Linefinder multiple	Meter MTJ and LTJ points	MTJ	LTJ and earth	Earth -ve wiper to operate each L relay, in turn
			LTJ	MTJ and earth (test once per level in A1, A2, A3 & A4)	
4	Group-selector multiple	Group-selector wipers	-ve and P wipers	+ve, M wipers and earth	Remove link T11, T12. Step selector manually over each contact. Test one switch in A1, A2, A3, A4
			+ve and M wipers	Earth	Test levels 2-0 Contacts 1-10
5	Junction relay-sets to diagram AT 3945	J.R.S. test jack	Test jack 3	Test jack 4 and earth	Manually operate relay K
			ditto	ditto	Release K, operate relay HA
			ditto	ditto	Release HA, operate relay HB
			Test jack 4	Test jack 3 and earth	Manually operate relay K
			ditto	ditto	Release K, operate relay HA
			ditto	ditto	Release HA, operate relay HB
6	Junction-hunter Mult. AT 3945	J.R.S. connexion strip	22A & 2A	12A and earth	Remove test link from T.J.11 & 12. Step uniselr. manually to each contact. Test on one R/S. only
			12A & 2A	22A and earth	ditto
7	Junction relay-sets to diagram AT 3949 or AT 4456	J.R.S. test jack	Test jacks 3 & 2	Test jacks 4 & 5 and earth	Remove test link from T.J.7 & 8. Insulate MB1 & MB2 (AT 3949) or MB2 and MB4 (AT 4456). Manually operate DB. Repeat on each R/S., in turn
			Test jacks 4 & 5	Test jack 3 & 2 and earth	
		J.R.S. connexion strip	23	13.3 & earth	Remove R/S. fuse. Repeat on each R/S., in turn
			13 & 3	23 and earth	
8	Junction relay-sets to diagram AT 3946 AT 3955 or AT 4906	J.R.S. test jack	Test jack 3 & 2	Test jack 4 and earth	Manually operate relay HB. Insulate P1 contact
			ditto	ditto	Manually operate relay HA. Release relay HB. Insulate P1 contact
			Test jack 4 & 2	Test jack 3 and earth	Manually operate relay HB. Insulate P1 contact
			ditto	ditto	Manually operate relay HA. Release relay HB. Insulate P1 contact. Repeat on each R/S., in turn

TABLE 2 *(Contd.)*

Test	Circuit	Access Point	Ohmmeter Connexions		Method
			L	E	
9	Junction relay-sets to diagram AT 3948 or AT 4454	J.R.S. test jack	Test jack 3 & 2	Test jack 4 & 5 and earth	Remove R/S. fuse. Insulate D02. Remove test link between T.j.7 & 8. Manually operate relay D8. Repeat on each R/S., in turn
			Test jack 4 & 5	Earth	
		J.R.S. connexion strip	22	12, 2 & earth	Remove R/S. fuse. Repeat on each R/S., in turn
			12 & 2	Earth	
10	Junction relay-sets to diagram AT 3947 or AT 4453	J.R.S. test jack	Test jack 3 & 2	Test jack 4 & 5 and earth	Remove R/S. fuse. Insulate D02 (AT 3947) or MB2 (AT 4453). Remove test link between T.J.7 & 8. Manually operate relay D8. Repeat on each R/S., in turn
			Test jack 4 & 5	Earth	
		J.R.S. connexion strip	22	12, 2 & earth	Remove R/S. fuse
			12 & 2	Earth	Repeat on each R/S., in turn
11	Junction relay-sets to diagram AT 3943 or AT 4455	J.R.S. test jack	Test jack 3 & 6	Test jack 4 and earth	Remove R/S. fuse. Insulate MB3 (for AT 3943) or MB2 (for AT 4455). Remove test link between T.J.7 & 8. Manually operate relay D8. Repeat on each R/S., in turn
			Test jack 4	Earth	
			Test jack $\overline{3}$	Test jack $\overline{4}$ and earth	Manually operate relay HB
			Test jack $\overline{3}$	Test jack $\overline{4}$ and earth	Manually operate relay HA. Release relay HB.
			ditto	ditto	Manually operate relay SK. Release relay HA.
			Test jack $\overline{4}$	Earth	Manually operate relay HB. Release relay SK.
			ditto	ditto	Manually operate relay HA. Release relay HB.
			ditto	ditto	Manually operate relay SK. Release relay HA. Repeat on each R/S., in turn

9. Mechanical Adjustments. A check of mechanical adjustments of relays, selectors and uniselectors should be made, in accordance with Specification TE 1749, each unit being tested in turn. All adjustment faults should be cleared by the testing officers and re-adjustments made with reference to the relative M.A.I.

If the number of faults found warrants general rejection and, if any other abnormalities are found during testing, particulars should be sent to the Eng. Dept. (E) giving details including the contractors code, unit mark number, and year of manufacture.

10. Functional Tests. Before the functional tests, which are detailed in Table 3, are made, all line-finders, selectors and uniselectors should be lubricated in accordance with B 5137 and the power plant should be tested in accordance with POWER, General, F 303C.

11. *Line-finder and Control Circuits.* These tests should be made on each A unit, in turn, before the subscribers' and spare-number jumpers are run.

TABLE 3

Test	Action	Check
1	Operate Line-finder routine key for level 1	Control-set No.1 seized. Associated group selector seized as L/F. steps to the level and rotates to 11th step. L/F. steps out of bank and restores. Group selector restores. Allotter steps once. The above cycle of events should be automatically repeated on successive switches, but L/F.s No.1, 5, 2, 6, 3, 7, 4 and 8 should be taken in this order.
2	Operate L/F. routine key for level 3	ditto
3	Operate L/F. routine key for level 5	ditto
4	Operate L/F. routine key for level 7	ditto
5	Operate L/F. routine key for level 2	Same for Test 1 except that control-set No.2 should be seized
6	Operate L/F. routine key for level 4	ditto
7	Operate L/F. routine key for level 6	ditto
8	Operate L/F. routine key for level 8	ditto
9	Operate L/F. routine key for level 0	ditto
10	Insert plug of Tele. No.80 into L/F. routine jack and depress the transmitter cut-out key. Operate L/F.routine key for level 9, and release, as soon as the L/F.has found the marked level	Control-set No.1 seized. L/F. steps to level 9 and rotates to 11th contact. Associated 1st. selector seized and held. L/F. lamp glows. Dial tone heard in receiver of Tele. No.80
11	Release, and re-operate, transmitter cut-out key of Tele. No.80. Operate L/F. routine key for level 9 and release, as soon as the L/F. has found the marked level	L/F. and 1st. selector release. L/F. lamp darkens. Next L/F. commences to hunt
12	Tests 10 and 11 should be repeated on each L/F. in the unit, in turn	As for tests 10 and 11
13	Insulate VR 1-2 of control-set No.1. Operate L/F. routine key for level 3	L/F. not seized immediately. T.P. uniselector in C unit commences to step. After a period of 9 to 19 seconds control-set No.1 lamp glows. Control-set No.2 is seized and the unit functions as in Test 5, except that the switch upon which allotter No.1 is standing is not seized.
14	With the press-button on C unit temporarily short circuited	Relevant CA lamp glows in C unit. FA relay in T.P. relay-set operated
15	Remove insulation from VR1-2 of control-set No.1. Remove, and re-insert,test link between T5 and T6 of control-set No.1 test jack	Unit commences to function as in Test 1
16	Restore L/F. routine key for level 3. Insulate VR1-2 of control-set No.2. Operate L/F. routine key for level 4	L/F. not seized immediately. T.P. uniselector in C unit commences to step. After a period of 9 to 19 seconds control-set No.2 lamp glows, control-set No.1 is seized and the unit functions as in Test 1, except that the switch upon which allotter No.2 is standing is not seized
17	With the press-button on C unit temporarily short circuited	Relevant CA lamp glows in C unit. FA relay in T.P. relay-set operated
18	Remove insulation from VR1-2 of control-set No.2. Remove, and re-insert,test link between T5 and 6 of control-set No.2 test jack	Unit commences to function as in Test 5
19	Remove fuse of control-set No.1. Operate L/F routine key for level 1	TB relay of control-set No.1 operates via YD resistor, battery and MRA immediately and unit commences to routine on level 9, except that L/F. connected to contacts upon which allotter No.1 is standing is not seized

TABLE 3 *(Contd.)*

Test	Action	Check
20	Replace fuse of control-set No.1. Remove fuse of control-set No.2. Operate L/F. routine key for level 2	TB relay in control-set No.2 operates immediately and unit commences to routine on level 9, except that L/F. connected to contacts upon which allotter No.2 is standing is not seized
21	Replace fuse of control-set No.2. Remove test link from T11 & 12 from all line-finders in unit under test, and manually step each switch off normal	Relay OFB releases and relay OFR operates
22	Operate and restore each L/F. routiner key, in turn	Relay OFR releases at each operation of a routine key and the relevant allotter hunts continuously.
23	Manually operate an L relay associated with level 3	Overflow meter operates and locks. Allotters do not hunt
24	Restore 1st L/F. to normal	Overflow meter steps. Allotters step to free outlet
25	Release the L Relay. Manually operate an L relay associated with level 4	Overflow meter operates and locks. Allotters do not hunt. Repeat the test for each working level remaining
26	Restore test link to T11 & T12 on second line-finder	Overflow meter steps. Allotters step to free outlet
27	Release L Relay. Restore all test links. Manually operate TB in control-set No.1	Relay H operates in L/F. to which allotter No.1 is connected
28	Manually step allotter No.1 to each contact, in turn	Relay H operates in relevant L/F. as allotter steps to corresponding contacts
29	Release relay TB in control-set No.1. Manually operates relay TB in control-set No.2	Relay H operates in L/F. to which allotter No.2 is connected
30	Manually step allotter No.2 to each contact, in turn	Relay H operates in relevant L/F. as allotter steps to corresponding contacts

12. *Selector Circuits.* These tests should be made on each A unit, in turn, before the subscribers' and N.U. jumpers are run. Details of the tests are indicated in Table 4.

13. The following connexions should be made:-

(a) Connect the service tele. 290 to any convenient line, by means of the test cord, and provide a temporary jumper in series with 1200 ohms for ordinary working to a line equipment in the A unit under test. This telephone will subsequently be known as 'tele. A'.

(b) Operate the IN and TEST CIRCUIT SPEAKING keys

(c) Connect a Tele. No.121F at the M.D.F. in series with 1200 ohms to any other convenient line and provide a temporary jumper for C.C.B. working to a line equipment in the A unit under test. This telephone will subsequently be known as 'tele. B'

(d) Connect another Tele. No. 121F at the M.D.F. in series with 1200 ohms to the first of three adjacent exchange lines. This telephone will subsequently be known as 'tele. C'.

(e) Provide temporary jumpers to the first two of the three lines mentioned in *(d)* and strap P 2 (of the 1st and 3rd lines, respectively) on the F/S connexion-strips in the A units, to make them the 1st and last lines of a P.B.X. group, as indicated in Dgm. AT 3723

(f) Connect one exchange number to N.U. tone

(g) Provide jumpers for the final selectors (when Cabling Scheme No.1 is used) and all working junctions

(h) Verify that all fuses are fitted and that they are of the correct rating

TABLE 4

Test	Action	Check
1	Busy each group selector in A unit under test, except the first. Remove receiver of tele. 'A'	Dial tone
2	Dial number of tele. 'B'	Ringing tone in tele. 'A' and bell of tele. 'B' rings
3	After two periods of ringing, remove receiver of tele. 'B'	Ringing trip, transmission and single-fee metering. Common apparatus stops
4	Replace receiver of tele. 'B'	Selectors remain held. Common apparatus starts, and selectors are released in from 1 to 2 mins. Common apparatus stops
5	Replace and lift receiver from tele. 'A' but do not dial	Verify TM relay does not operate immediately selector is seized. Selector released in from 1 to 2 mins. Common apparatus stops
6	Replace receiver of tele. 'A' and remove it again. Dial each spare level in the G/S. banks, in turn	N.U. tone. No metering
7	Remove receiver from tele. 'A' and dial the exchange number connected to N.U.	N.U. tone. No metering
8	From tele. 'B', dial each level barred to C.C.B. subrs.	N.U. tone. No metering
9	Remove receiver from tele. 'A'. Remove receiver from tele. 'B'. From tele. 'A', dial tele. 'B'	Busy tone. No metering
10	Replace both receivers. Busy all final selectors associated with level 2. From tele. 'A', dial 2. Manually hold A relay in the G/S.	Busy tone. Receipt of flash on T4 of the G/S. by means of test lamp
11	Replace receiver of tele. 'A'. Unbusy final selectors	Switch releases; overflow meter operates; meter of tele. 'A' does not operate
12	Transfer tele. 'B' to second line of P.B.X. group. From tele. 'A', dial first line of P.B.X. group	Ringing tone in tele. 'A' and bell of tele. 'C' rings
13	Remove receiver of tele. 'C'	Ringing trip, transmission and single-fee metering. Common apparatus stops
14	Replace both receivers	Switches release
15	Busy first line of P.B.X. group. From tele. 'A' dial first line of P.B.X. group	Ringing tone in tele. 'A' and bell of tele. 'B' rings
16	Remove receiver of tele. 'B'	Ringing trip, transmission and single-fee metering. Common apparatus stops
17	Replace both receivers	Switches release
18	Busy all three lines of the P.B.X. group. From tele. 'A', dial first line of the P.B.X. group	F/S. hunts over first two lines in the P.B.X. group and returns busy tone after testing third line. No metering
19	Replace receiver of tele. 'A'	Switches release
20	Conducts tests 1 to 19 on all switches in the unit, in turn, using G/S.2 with F/S. 2, G/S. 3 with F/S.3, etc. When all F/S.s have been tested out some G/S.s remain to be tested, the last F/S. should remain unbusied and be used to test all the remaining G/S.s. Tests 1, 2, 3, 5, 6, 8, 10 and 11 only need be applied under these circumstances	
21	Verify that each group selector in A1, A2, A3 and A4 has access to all final selectors in A1 and A2 (by dialling '21' from tele. 'A') and to all final selectors in A3 and A4 (by dialling 31 from tele. 'A'), each final selector being busied, in turn	

14. *Subscribers' Calling Equipments.* A call should be received by, and originated from, each calling equipment, in turn.

(a) Connect the service tele. 290 to any convenient line by means of the test cord. Insert a 1200-ohms resistor in series with one wire of the line to the service tele. Provide a 'flying' jumper so that connexion can be made to each calling equipment in turn. This tele. will subsequently be known as Tele. 'A'.

(b) Operate the IN and TEST CIRCUIT SPEAKING keys

(c) Connect a Tele. No. 121F in series with a 1200-ohms resistor to any other convenient line and provide a 'flying' jumper so that connexion can be made to each calling equipment in turn. This tele. will subsequently be known as tele. 'B'.

Tests should be made as detailed in Table 5.

TABLE 5

Test	Action	Check
1	Connect tele. 'A' to first line circuit in A unit. Connect tele. 'B' to last line circuit in first A unit. From tele. 'A', dial tele. 'B'	Dial and ringing tones, ringing, ringing trip, metering, transmission and release
2	From tele. 'B', dial tele. 'A'	ditto
3	Remove receivers from teles. 'A' and 'B'	P.G. throw-out in 1 to 2 minutes. P relay in line circuits hold. P.G. lamp glows (press-button being short-circuited). P.G. lamp does not glow on removal of associated 'U' link in unit C
4	Move tele. 'A' to second line circuit and tele. 'B' to last-but-one line circuit. Busy selector used in previous calls and repeat tests 1 to 3	
5	Continue tests until all line circuits in first A unit have been tested and repeat the tests in the remaining A units. Selectors should be used in order and when each selector has been used all the selectors should be unbusied and the cycle repeated until all the line circuits in the unit have been tested	

15. *Subscribers' Meters and Meter-test Circuit.* Tests should be made as detailed in Table 6.

TABLE 6

Test	Action	Check
1	Connect 4-way plug to meter routine-test jack in first A unit. Operate meter-test key to operate	Meter-test lamp glows
2	Operate meter-test key to NON-OPERATE	ditto
3	Connect 2-way plug to MTJ and LTJ jacks of first meter in unit	Meter-test lamp glows. Ringing and meter-pulse circuit starts
4	Manually operate, and restore, L relay associated with circuit under test	Meter-test lamp darkens and glows
5	Manually operate, and restore, P relay associated with circuit under test	ditto
6	Operate meter-test key to operate	Meter registers ten operations. Meter-test lamp flashes
7	Restore meter-test key and operate to non-operate	Meter does not operate. Meter-test lamp flashes ten times
8	Apply tests 3 to 7 to each subscriber's meter, in turn	

16. *Subscribers' Junters.* All working subscribers' lines should be jumpered and spare lines connected to N.U. tone.

17. *Multi-metering Equipment.* Tests should be made to prove that the junction relay-sets function correctly under all conditions. Before the commencement of these tests, verify that the line-testing circuit (dgm. AT 3665) is in working order.

18. Each individual multi-metering junction relay-set and, if fitted, the auxiliary relay-set (common equipment) should be strapped in accordance with the charts provided for the exchange.

The tests should be performed as follows:-

(a) Insert the test clips into the first junction on the M.D.F. and operate the IN and SPEAKING BATT keys.

(b) Busy the second junction on the relay-set test-jack springs.

(c) From the service telephone, dial sufficient digits to position the multi-metering uniselector on the first strapped contact. Check result from Table 7:-

TABLE 7

Contact strapped to	Result if O.K.
SP	N.U. tone received. No metering
M) MB)	No metering after operation of reversing key
1F) 2F) 3F) 4F)	Appropriate metering within 3 seconds of operation of reversing key

(d) Restore the reversing key, replace the receiver and continue until all strapped contacts have been tested.

(e) Repeat the tests dialling from a Tele. 121F connected to a C.C.B. line. Check results from Table 8:-

TABLE 8

Contact strapped to	Result if O.K.
SP) MB) 2F) 3F) 4F)	N.U. tone received. No metering
M	No metering after operation of reversing key
1F	Single-fee metering within 3 seconds of operation of reversing key

MISCELLANEOUS TESTS

19. Congestion Test. Engage all linefinders in the first A unit by looping lines at the M.D.F. Loop another line, at the M.D.F., the line circuit of which is in the first A unit. The overflow meter should operate, and lock, but not register an overflow. Release, and re-engage, one of the linefinders. The overflow meter should register once. The test should be repeated on the remaining A units.

20. Transmission Tests. Each transmission bridge associated with selectors and junction relay-sets should be tested for transmission loss in accordance with TRANSM., Tele., F 1101 to 1106 and F 1109.

21. Test of Spare Numbers. From the service telephone, dial each spare number in turn. Verify the receipt of N.U. tone and the non-operation of the calling meter.

22. Alarms. The press-button on the C unit should remain short-circuited temporarily during the tests for alarms which are detailed in Table 9:-

TABLE 9

Test	Action	Check
1	From the service tele., dial 299 and listen throughout tests 1 to 9	Inverted ring tone
2	Simulate a blown fuse (other than FA) on each A, B and C unit, in turn	Inverted ring tone replaced by N.U. tone. Relevant FA lamps on C unit glow
3	Simulate a blown FA fuse on each A, B and C unit, in turn	ditto

TABLE 9 *(Contd.)*

Test	Action	Check
4	Simulate a blown positive-battery fuse (other than FA) on C unit	Inverted ring tone replaced by N.U. tone. Relevant FA lamps on C unit glow
5	Simulate a blown positive-battery FA fuse on C unit	ditto
6	Manually hold a group selector off-normal in each A unit, in turn, and then release	Inverted ring tone replaced by N.U. tone. Relevant release lamps glow on C unit
7	Manually hold a final selector off-normal in each A unit, in turn, and then release	ditto
8	Simulate charge-failed conditions on the charging panel, and restore	Inverted ring tone replaced by N.U. tone. Charge-fail lamp glows
9	Manually operate T relay in ringing and meter-pulse R/S., and release	Inverted ring tone replaced by N.U. tone

23. U Links. Verify, by removing links singly, that each 'U'-point in the C unit disconnects the Busy-, Dial-, N.U.-, and Ringing-tone, Ringing current, and Inter-battery and Earth, respectively, from the relevant units.

24. Test of Junction Facilities. Before transfer, each junction relay-set should be tested to the distant exchange in association with its distant-end termination. Normally, one junction line of each route should be used for testing purposes, and each termination should be connected to this line, in turn, by means of a 'flying' jumper.

25. The tests should be made in accordance with the relevant E.I. as detailed in Table 10.

TABLE 10

Relay set to be tested	Distant Exchange	E.I. TESTS & INSPECTIONS, Routine, ...
AT 4906 AT 3943	Parent	R 5832
AT 3943	Non-Parent	R 5833
AT 3945 AT 3947 AT 3948	Dependent U.A.X.	R 5835
AT 3946 AT 3955 AT 3949	Non-dependent Auto (except U.A.X.)	R 5834

26. Call-through Test. After completion of all the foregoing tests, a call-through test should be made to check that the equipment is ready to be brought into service. All jumpering should be completed. The procedure for the call-through tests is as detailed below:-

(a) Connect two telephones No.121F (teles. 'A' and 'B'), each in series with 1200 ohms, to Plugs No.222. Connect teles. 'A' and 'B', at the M.D.F., to the first two working lines.

(b) From tele. 'A', dial tele. 'B'; verify correct tones, etc. After hearing two periods of ringing tone, answer the call, operate the receiver rest several times, prove transmission and verify that the meter associated with the calling tele. operates once. Clear the call.

(c) From tele. 'B', dial tele. 'A'; verify the facilities as in *(b)*.

(d) Shift the Plugs No. 222 to the next two working lines on the M.D.F.; repeat tests *(b)* and *(c)* and continue until a call has been originated from, and received by, each working line.

NOTE:- All linefinders, group and final selectors should be used at least once during this test.

(e) A call should be passed from the distant exchange over all incoming junctions; verify correct supervisory conditions, tones, transmission, trunk offering and release, on each junction line with its associated equipment.

(f) From the service tele. 290, and from a C.C.B. telephone, dial over all outgoing junctions, in turn; verify correct calling and supervisory signals, tones, transmission and release, on each junction line with its associated equipment.

27. *U.A.X. No.13.* The testing procedure for a standard U.A.X. No.13 installation should be followed when a U.A.X. No.13 is installed. If the outlets from the group selectors have been graded, each outlet should be looped several times at the grading to check the seizure of the correct final selector.

28. *M.A.X. No.13.* The testing procedure for a standard U.A.X. No.13 installation should be followed when a M.A.X. No.13 is installed. In addition, the following points should be observed.

(a) Continuity and insulation tests of the equipment in each vehicle should be made prior to the connexion of the tie-cables between the vehicles.

(b) Continuity and insulation tests of the tie-cables should be made prior to their termination.

(c) The inter-vehicle battery feeds should be connected prior to the commencement of testing.

29. *On completion of all tests,* the temporary short-circuit across the press-button in the C unit should be removed.

References:- (E2/4)
B 5137, G 3530
POWER, Gen., F 3030
TESTS & INSPNS., Routine, R 5832, R 5833, R 5834, R 5835
TRANSM., Tele., F 1101 to F 1106 and F 1109

E N D